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LEFT-HANDEDNESS IN NORTH AMERICAN ABORIGINAL ART

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Among educated Americans and Europeans of the present generation from 2 to 4 per cent are positively left-handed. They write, draw, eat, sew, etc, easier and better with the left than with the right hand. The remaining 96 per cent are either markedly right-handed or else more or less ambidextrous. Several interesting questions are suggested by this fact:

Has this proportion always been the same in the human species, and does it obtain today among savage tribes?

What are the physical and psychical correlations of left-handedness?

What is the explanation of the general superiority of the right hand and the occasional superiority of the left?

I shall devote myself at present to the first of these inquiries and at the close offer some observations on the others.

Archeologists have not neglected to study the relics of primitive man with the aim of ascertaining his dextral or sinistral preferences, but their conclusions have not been uniform. Dr John Evans, as quoted by Sir Daniel Wilson, claims that there was a manifest predominance of right-handedness among the paleolithic flint-workers of southern England[1], basing his conclusion mainly on the "levogyric" planes of the stone blades they chipped—a point which I shall explain later. On the other hand, M. G. De Mortillet, in 1890, examined 354 stone-scrapers (*grattoirs*) from various stations in France and Switzerland—all of the double-edge form, which must have been held in the hand (not hafted)—and obtained the following curious results:[2]

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[1] Sir Daniel Wilson: *Left-Handedness*, p. 57, London, 1891. It is proper to remark at the outset that Sir Daniel rejected the opinion advanced in the present article, to the effect that savage races and primitive men present greater evidences of left and both-handedness than modern, civilized people. See his work, pp. 165, 166.

[2] *Bulletins de la Société d'Anthropologie de Paris.* Séance du 3 Juillet, 1890. His conclusion is expressed in these words: "Ce-qu'il y a de certain, c'est que, pendant le préhistorique, les gauchers etaient beaucoup plus abondants que de nos jours dans nos regions."

Of mixed or indeterminate types	52
For use in the right hand	105
For use in the left hand	197

This indicates a decided preference for the use of the left hand when working with this implement. He therefore concludes that in those localities the primitive population included many more left-handed persons than is the case at present.

This apparently did not hold good of the very early tribes whose instruments are exhumed from the Somme gravels, for the same writer states that most of the specimens of hand-stones they left are suited to the right, not the left hand.[1] This statement also has been made about the hafts and handles of the bronze sickles and swords from the Swiss lake dwellings and from the barrows of England.[2]

In the museum of the University of Pennsylvania there are two chipped flints of the paleolithic type, deeply patinated, from the Libyan plateau, near Abydos, on the Nile. They are considered by Professor Flinders-Petrie to belong to the most ancient prehistoric Egyptian art. Both are clearly intended to be held in the left hand only.

Turning to native American tribes, I will give the results of some of my own studies. That left-handed persons were not infrequent is shown by the native languages. Sir Daniel Wilson presents some examples,[3] and the list can readily be extended. It is to be noted that the terms for the left in a number of these languages has not the sinister sense attached to them which we find in most Aryan tongues. In Cree, *namatinisk*, "the left hand," is evidently from the radical, *nama*, no, not, a simple negation,[4] which has a curious parallel in the Egyptian hieroglyphs, where the gesture-sign for negation is related for that to left.[5]

Another coincidence of conception may be mentioned between the Mayas and the Chinese. The latter regard the left as auspicious, the right as inauspicious, and as they love peace, a soldier and all weapons are assigned to the right. The Mayas regarded the left, *dziic*, as inauspicious, and the word for soldier, brave, etc., *dziic*, *dziicil*, singularly enough are from that root.[1]

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[1] *Le Préhistorique Antiquité de l'Homme*, pp. 142, 143. This work, published in 1883, was before the author gave close attention to the subject.

[2] Compare Dr John Evans: *Bronze Implements of Great Britain*, chap. VI, New York, 1881.

[3] Op. cit., pp. 68, 69.

[4] Lacombe: *Dictionaire de la Langue Crise*, sub voce. My derivation is not identical with that quoted by Sir Daniel Wilson.

[5] W. J. Hoffman: *The Beginnings of Writing*, p. 124.

But it is the examination of stone implements, especially blades (arrow and spear heads), which has given me the more positive results. In pursuing the investigation I have had recourse to some methods which I must first describe.

It is obvious that to test the right- or left-handedness of a blade we must start from some fixed point or position. This is offered, it seems to me, by the "plane of cleavage"—that more or less flat surface which lay next the "core" when the fragment was detached from it by the blow of the hammerstone. It is difficult or impossible to detect this plane in a blade which has been carefully dressed on both sides, and therefore in "fancy collections," made up of "choice specimens," the student will find few examples in which it is distinguishable; but if he takes a series gathered without reference to perfection of condition, he will readily recognize the plane of cleavage in about one-third of the number—often in one-half. Placing those which show this plane on a flat surface, he will at once notice that many of them are laterally asymmetrical—that is, the point of the blade will fall to the right or to the left of a line drawn at right angles to the center of the base. This "asymmetry" of American blades has been noticed and commented on by several observers, Prof. S. S. Haldeman[2] and others. They have attributed it to inaccurate workmanship, "economizing broken specimens," etc. That such explanations are inadequate is at once suggested by the fact that the asymmetry is not equally present in both halves, but in the decided majority of cases is greater on the left than on the right side. This points to the right side having been "dressed down" by the preferential use of one hand—the right. This "dressing down" by secondary chipping, imparting a higher finish to the right side, is observable in the majority of cases, whether asymmetrical or not. It shows that in the process of trimming the blade, whatever that was, there was greater facility in working the right side.

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[1] Pio Perez: *Diccionario de la Lengua Maya*, sub voce. The attribution of good fortune to the left side and left hand is very ancient among the Chinese, as it is dwelt upon by Lao Tse in the thirty-first chapter of the *Tao-tih-king.*

[2] See the article by Professor Haldeman, "On Unsymmetric Arrowheads and allied Forms," in the *American Naturalist*, May, 1879, pp. 293, 294.

I have been unable, however, to verify the suggestion of Mr F. H. Cushing that the flake-grooves left by the right-hand worker trend from right to left, and those by the left-hand worker from left to right.[1] Even in the finest obsidian specimens I have examined, I cannot convince myself that this depends on anything else than the position in which the blade was held in chipping.

As noted by Dr John Evans, the median plane of a stone blade is often not horizontal, but describes a slight spiral, the point of which may turn either to the right or to the left with reference to the "plane of cleavage." This might be owing at times to design, imparting to it the boring power of an auger, or to accident, arising from the grain of the stone; but, these excluded, the preferential dressing on the right tends to carry the spiral to the left, and vice versa, indicating the predominance of one or the other hand. Adopting botanical terms for this peculiarity, I may refer to such spiral specimens as "levogyric," turning to the left, and "dextrogyric," turning to the right.[2]

I have applied these measurements to several hundred blades in the Museum of the University of Pennsylvania, taken from different parts of the United States, and present the results below:

One Hundred Blades from Butler County, Ohio, Surface Finds, mainly Chert and Jasper.

Plane of cleavage distinguishable in	57
Asymmetrical, point to the left	26
Asymmetrical, point to the right	11
Finish better on right side	42
Finish better on left side	15
Spiral not observable in	78
Spiral levogyric (right to left)	18
Spiral dextrogyric (left to right)	4

Fifty Blades from Northern Wisconsin, mainly Chert, Quartz, and Jasper.

Plane of cleavage distinguishable in	37
Asymmetrical, point to the left	8
Asymmetrical, point to the right	2

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[1] Quoted by Sir Daniel Wilson, op. cit., p. 54, who adds that Professor O. T. Mason "confirmed from his own observation" Mr Cushing's statement. Sir Daniel quotes this from the Transactions of the Anthropological Society of Washington, May, 1879, but I have examined the volume covering this period and do not find the statement. Possibly it was published elsewhere.

[2] For instance, the *Eucalyptus globulus* twists the fiber of its wood to the left, and hence is *levogyric*. That the navel string turns in this direction also would scarcely have escaped the notice of the savage mother.

Finish better on right side	7
Finish better on left side	3
Spiral not observable in	44
Spiral levogyric in	6
Spiral dextrogyric in	1

Fifty Blades from Lumberton, New Jersey (Delaware Valley)—Materials, Argillite, Jasper, Quartz, and Black Chert.

Plane of cleavage distinguishable in	32
Asymmetrical, point to the left	11
Asymmetrical, point to the right	4
Finish better on the right side	14
Finish better on the left side	4
Spiral not observable in	42
Spiral levogyric	6
Spiral dextrogyric	2

Of course it will be understood that the asymmetry, finish, and spirality were noted as left or right only in those specimens where the plane of cleavage could be recognized.

If the sum of the peculiarities noted in the three series be computed, it will be seen that the totals are 138 and 46, bearing the exact proportion, as it happens, of three to one. This speaks positively in favor of the preferential use of one hand, even allowing a liberal margin for methods of workmanship, etc.

The hand preferred was no doubt the right hand, but the notably large proportion of 33 per cent for probably left-handed work indicates either that there were more left-handed persons or, as I prefer to believe, that there were more who were ambidextrous. This may have been due to the fact that the methods of flint-chipping favored the development of the use of both hands, but it is as likely that it indicates a general physiological tendency.

I shall not refer at any length to the left-handed drawings of the North American aborigines. Sir Daniel Wilson states that profile drawing by a primitive right-handed artist nearly always looks to the left, while a left-handed draftsman almost certainly makes his figures look to the right.[1] I have examined Colonel Mallery's collections of rock and other drawings and find a decided predominance of the former, but also the not infrequent occurrence of the latter.[1] The Mayan codices do not always present the profiles to the left, as Sir Daniel Wilson thought, as there is a notable exception in the Codex Peresianus.[2] However, other considerations—ceremonial, religious, and conventional—enter so largely into this part of the subject that I shall not further refer to it.

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[1] Op. cit., p. 33.

Right-hand counting by the American aborigines has been so ably discussed by Mr Cushing[3] and Professor Conant[4] that I shall merely observe that the latter gives also some examples of left-hand counting.

From the above facts the modest conclusion seems justifiable that the aboriginal race of North America was either left-handed or ambidextrous to a greater degree than the peoples of modern Europe.

As this agrees with the conclusions of Mortillet about the Stone age of France and Switzerland, does it not point to some general physiological condition?

Sir Daniel Wilson, speaking of cultured Europeans, reaches the conclusion that while a few persons have a "natural and instinctive" preference for the right hand and a less number an equally decided preference for the left, "with the great majority right-handedness is the result of education,"[5] a statement confirmed by the observations mentioned by Professor James Sully that more than one-fourth of the English school children of the age of five years cannot distinguish in use the right hand from the left.[6]

To the same effect the researches of Preyer on right- and left-handed writing appear to demonstrate that the cerebral centers of right and left motive power are bilateral and symmetrical and functionally parallel. Embryologically, they are equal, and pathological cases prove that when one becomes diseased the other can readily take up its functions.[1]

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[1] Garrick Mallery: *Picture Writing of the American Indians*, in Tenth Annual Report of the Bureau of Ethnology. Good examples of apparently left-hand work are the petroglyph on Illinois river, p. 79; that on Indian God rock, Pennsylvania, p. 110, and that in Brown's cave, Wisconsin, p. 126. It is worth noting that the alleged mammoth on the "Lenape stone" is a left-hand drawing.

[2] See my *Primer of Mayan Hieroglyphics*, p. 79, Boston, 1895. How far manual peculiarities influenced the "ceremonial circuit" has still to be investigated. Facing the east, the right hand only can describe in gesture the course of the sun in his daily path (von Meyer).

[3] See Mr Cushing's thoughtful article on "Manual Concepts" in the *American Anthropologist*, October, 1892.

[4] L. L. Conant: *The Number Concept, its Origin and Development*, pp. 13-16, New York, 1896.

[5] Op. cit., pp. 127, 128. This, however, is in some measure contradicted by his assertion (p. 118) that compliance with custom is an inadequate reason for right-handedness.

[6] *Studies of Childhood*, p. 484, London, 1895. He adds that a positive preference for the right or left hand may be displayed as early as the seventh month of infant life.

If all this is so, why the decided and general preference for the right hand and side, a preference which we have seen has existed in the majority of mankind from earliest times, though not always in the same degree?

The real reason has been suggested, but, so far as I know, not fully expressed, nor traced to its final source. This source I take to be *the erect posture of the human species.* The anthropoids and other primates closest to man are ambidextrous, displaying no preference for either hand. But the erect posture introduces a new distribution of force in the economy; it opposes the powerful retardation of gravity to the distribution of the arterial blood above the level of the heart. The great arteries arising from the aorta carry the blood by an appreciably shorter course and in less time to the left brain than to the right. Its nutrition, therefore, is the more abundant and its vitality the more active of the two hemispheres. Hence the right side of the body, which it controls, is more ready to respond to a stimulus on account of its higher innervation.[2]

The difference of the two hemispheres while thus computable is not sufficient in the majority of cases to induce right-handedness without educational influence; but even in savage conditions this would be moderately exerted. In such conditions we should expect and we appear to find that the specialization of the hands is less than in civilized culture-stages. As to the obstinate left-handedness still present in two or three per cent of our population, it is in part undoubtedly hereditary and in part is probably due to some anomaly of the arterial distribution.

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[1] W. Preyer: *Zur Psychologie des Schreibens*, pp. 38–45, Hamburg, 1895.

[2] I am aware that Dr Buchanan has referred to the erect posture in this connection, but not in the bearing which I assign it (see Sir Daniel Wilson, op cit., p. 198), and also that Virchow has laid considerable stress on the arterial supply to the left brain, but not attributing the difference to the erect posture (see his remarks in the *Verhandlungen* of the Berlin Anthropological Society, Bd. V, s. 34).